Thomas Hill's two 20 minutes presentation:

1. A Low-Cost Communications Infrastructure for Mars Missions

A crewed mission on Mars will require communications with Earth 24 hours a day. The rotation of Mars makes it necessary to relay data through a satellite for approximately half the time. This talk discusses a communications relay system that uses small satellites launched as auxiliary payloads aboard the Ariane V booster to cover an entire hemisphere on Mars. Using aerocapture and eccentric orbits, communications payload delivered to Mars orbit is maximized. This system will also be able to relay data to and from surface crews on extended missions away from their base, and to uncrewed landers nearby.

2. Halfway to Anywhere - Using Orbital Electrolysis to Cache Propellants in Low Earth Orbit and Jump-Start an Inexpensive Launch Industry

Robert Heinlein was quoted as saying "Once you're in Low Earth Orbit (LEO), you're half way to anywhere". The dynamics of space exploration dictate that a lot of energy must be expended to get mass into LEO. Once there, moving on is relatively easy. This proposal involves placing a cache of water, liquid hydrogen, and liquid oxygen in LEO. Any spacecraft (with the proper equipment) can dock with this satellite and refuel, greatly expanding its reach beyond. The system uses repeated flights of a simple payload to stock the cache, which has the potential of increasing launch rates to an economically viable value and bring the cost of launch down.